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MINERAL DEVELOPMENT POLICY

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MINERAL DEVELOPMENT POLICY

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Introduction

1) The development of a nation's mineral resources is an unending challenge calling for close co-operation between government and private industry. Under the free enterprise system both the public and the private sectors have functions that are essential to the orderly and continuous growth of a healthy mining industry.

2) Government must supply the base maps from which an intelligent prospecting or exploration program can be organized; it must establish regulations under which title may be obtained and mineral deposits exploited; it must provide the laboratories and scientists necessary to promote processing and testing of minerals; it must devise an educational system designed to provide scientists, engineers and prospectors to serve the industry; it must provide the stable political climate and equitable taxation policies necessary to encourage the investment of capital required to develop the nation's mineral resources.

3) Private industry must supply the knowledge and capital to explore, develop and exploit the mineral deposits. These activities in a particular area will probably exceed in detail the scope of government programs. As will be pointed out, the experience of developed countries, such as Canada, can be drawn on as a guide to assist planning and regulation.

4) Although Canada is a relatively young nation, 5 years from its 100th anniversary, its mining industry is well developed and Canada is the world's foremost exporter of mineral products. The value of its mineral production in 1961 was 2,575 million dollars. Canada is the free world's largest producer of nickel, asbestos and platinum and it is second in uranium, cadmium, gypsum and titanium; third in aluminum, zinc, gold, cobalt and bismuth; fourth in silver, magnesium, barite and lead; and fifth in copper. Minerals and mineral products account for 40 per cent of all revenue freight traffic within Canada and have been responsible for the construction of 1,343 miles of railway since the end of World War II. Minerals and mineral products provide 40 per cent of all Canadian exports.

Minerals Jurisdiction

5) Under the federal system of government enjoyed by Canada, all mineral rights, with the exception of those in the federally-administered Yukon and

Northwest Territories, Indian reservations and National Parks, are vested in the various provinces of Canada, of which there are ten. This situation has its origin in the British North America Act of 1867. Excepting Prince Edward Island, which has no mining industry, all provinces of Canada have their own mining acts and other pertinent legislation through which the provinces administer and regulate the mineral industry within their boundaries. Mineral exploration, development and production in the Yukon and Northwest Territories are under the jurisdiction of the federal Department of Northern Affairs and National Resources.

6) A basic requirement for mineral development by private enterprise is security of land tenure and this has been provided by the legislation of the various federal and provincial government bodies concerned with minerals jurisdiction. The various mining acts and regulations are revised periodically to keep pace with changing conditions. Uniformity between provinces is not usually attempted or maintained and sections of the various acts vary widely. However, they all have a common goal: the most advantageous exploitation of mineral resources for both the province and the mineral industry.

7) The main purposes of the Mining Acts are the disposition of mineral rights and the provision of rules for mineral development. All the Acts are generous in that mineral rights on Crown lands can be acquired simply by staking. The right to stake is granted under a prospector's license, which may be acquired annually for a nominal sum. Canadians, other British subjects, and aliens over 18 years of age all have the same rights and privileges with respect to exploration for and development of minerals in Canada. Mining claims may be staked anywhere in Canada, except in national and provincial parks and Indian reservations, without the necessity of discovering a mineral deposit prior to staking. Once a claim is staked, the staker's rights are protected for a period of about 5 years, provided certain specified work is performed each year; assessment work requirements vary between areas although they are not particularly stringent in any area. In most cases, such activities as geological or geophysical surveys are accepted for assessment purposes.

8) If a mineral deposit is discovered on a claim, the right to proceed with extraction is granted under a long-term lease, a concession or a permit, which is renewable. In the two major mining provinces of Ontario and Quebec, absolute title to mining claims can be obtained by bringing claims to patent. The return to the provinces for the granted extractive rights takes the form of moderate royalties on production.

9) The staking of claims is historically the means by which most of the mineral rights in Canada have been acquired. However, in remote and virgin areas of Canada, where exploration is costly, large tracts of land are granted to responsible exploration groups on a permit, concession or lease basis. These grants carry exclusive exploration rights to the lessee for a specified period of time. This procedure has hastened the exploration and development of mineral resources in areas that might have otherwise remained unexplored.

10) It has been the Canadian experience that security of land tenure is fundamental to the encouragement of mineral exploration and development and to the attraction of private capital. Without security of land tenure, other inducements or incentives may be of little avail. However, when security of tenure is not only present but is accompanied by the generous disposition of mineral rights and incentive taxation and, of course, interesting geology, then mineral exploration and development may be assured.

Tax Incentives

11) Federal corporate income tax legislation provides substantial direct encouragement to the Canadian mineral industry - a three-year tax-exempt period for new mines, income tax allowances for pre-production costs, generous depletion and depreciation allowances, freedom from capital gains tax, and special excise tax and customs tariff provisions. Since the three-year tax-exempt period was first introduced in 1935, Canadian mineral output has grown in value from 313 million dollars in 1935 to the 2,575 million dollars of 1961. The three-year tax-exempt period, of course, has not been wholly responsible for this growth but it is representative of the general federal encouragement provided the mineral industry and it has played an important part in promoting its growth. Through this provision, a new mine is given the opportunity to recover, before the imposition of taxes, a large part of the capital expenditure which was necessary to achieve production, thereby according recognition to the financial risk inherent in mining ventures.

12) The federal government has provided special encouragement in certain other instances when circumstances have so warranted. An example of such special encouragement was the deep-test oil well legislation in effect during the period 1942 to 1956. This legislation provided special income tax deductions as an encouragement to extend the petroleum resources of Canada, in new localities. Federal income tax legislation was amended to encourage the exploitation of potash, and of bituminous sands, both of which Canada has in large quantity. Federal income tax legislation has recently been amended to encourage the further processing of minerals in Canada and to encourage product research. No export taxes are levied on Canadian minerals or mineral products.

13) As the British North America Act provides for both the federal government and the provinces to levy direct taxes, such as income taxes, both levels of government have endeavoured to provide similar income tax incentives to the mineral industry so that the encouragement provided by the one level of government is not decreased but is, instead, enhanced by the other level of government. This similarity of treatment is exemplified in Canadian corporate income tax arrangements whereby the federal government collects the provincial share of corporate income taxes on behalf of most of the provinces; the same incentive provisions as apply to the federal share of this tax also apply to the provincial share.

14) Royalty and mining tax provisions of the various governments are all designed to encourage exploration, in that they are virtually all levied on production or profits, rather than on ore reserves in the ground. Such levies are usually moderate and so arranged as to place a minimal financial burden on the lower profit mines. In some instances, they provide inducements to mining companies to process minerals beyond the concentrate stage within the province in which the minerals are mined. In two provinces and in the Northwest Territories, new mines are granted a three-year period of exemption from royalty and mining taxes; this benefit is in addition to the three-year period of exemption from corporate income taxes.

15) It is Canadian experience that the surest method of encouraging mineral exploration and development is by means of tax incentives, particularly those measures which permit a mining company to obtain early and complete recovery of its capital investment. Permissive recovery of capital investment gives recognition to the intrinsic risks of mineral development and provides insurance against the changing attitudes of changing governments. A detailed examination of the tax incentives used by the different levels of government in Canada might well provide developing countries with useful ideas for the encouragement of mineral exploration, development and exploitation.

Government Services

16) An important adjunct to the provision of financial incentives in Canada has been the provision of government services. The federal government provides the basic geodetic, topographic and hydrographic maps required for mineral exploration and development and amends its annual programs wherever necessary to assist the development of major new mineral discoveries. The federal government and certain of the provincial governments have well organized geological survey establishments and provide basic geological maps for exploration and prospecting. Exploration and prospecting have been, historically, the functions of private enterprise in Canada.

(a) Geological Survey of Canada The work of the Geological Survey of Canada, a branch of the federal Department of Mines and Technical Surveys in Ottawa, and the work of the various provincial geological survey establishments are complementary. The Geological Survey of Canada, which was formed in 1842 (and so predates Confederation in 1867) and which now has an establishment of 200 professionals and 200 supporting personnel, generally undertakes geological mapping on a broad regional scale. The provincial geological surveys generally investigate, in detail, the economic worth of the known mineral occurrences which appear to be of immediate economic importance and which occur on provincial Crown land. The Geological Survey of Canada is responsible for the systematic geological mapping of Canada. The Survey has moved with the times, taking advantage of all the modern advances in the fields of science; it is, today, a complex, integrated survey and research organization engaged in all aspects of the geosciences. Although its aims are scientific rather than commercial, its field program and associated laboratory investigations are designed to benefit, now and in the future, those engaged in mineral exploration and development. The Geological Survey's prime task of mapping and interpreting the geology of the country is essential to the orderly and efficient development of Canada's mineral resources. Any country which has yet to develop its mineral resources could profit considerably from a study in detail of the development, organization and procedures of the Geological Survey of Canada. Immediate advantage could be taken of the strides made by the Survey in modern techniques in the field and laboratory. Of particular significance in exploration techniques in recent years has been the use of helicopters, the Piper Super Cub, and aerial geophysical surveys. Through the use of large, low-pressure tires, the Super Cub can be used to land geologists in areas to be surveyed regardless of the roughness of the ground. From the year 1952, when the Survey first used helicopters, to the present, more of Canada has been mapped than was done in the 110 years prior to 1952. During this period, the aeromagnetic maps obtained from aerial geophysical surveys have become an integral and essential part of the Survey's regional mapping programs. The results of the work of the Geological Survey of Canada are made available through the regular publication of geological, geophysical and geochemical maps and reports. These reports and maps are of great importance and value to mineral exploration companies in Canada.

(b) Mines Branch The federal government and some of the provincial governments provide such specific services as free mineral analyses to prospectors, grubstake or prospectors' assistance programs, educational courses for prospectors, and ore dressing research. For instance, the flow sheets for all Canadian uranium mines were developed in the laboratories of the Mines Branch of the federal Department of Mines and Technical Surveys. The Mines Branch, first formed in 1907 out of part of the Geological Survey of Canada, has evolved into a complex research organization with an establishment of approximately 400 engineers and scientists and 250 supporting personnel. The Branch's chief purpose is to serve the mineral industry through research. It is engaged in applied research and technical services to assist the mineral industry and other government organizations in

solving immediate problems related to minerals, metals and fuels and it is also engaged in fundamental research in anticipation of the future needs of the mineral industry. The Mines Branch has no parallel in the provinces, although two or three of the provinces undertake applied ore dressing research through their own mines departments or provincial research foundations. Increasingly, the Branch is encouraging the provinces and industry, with some success, to undertake more applied research so that the Mines Branch laboratories may concentrate more on fundamental, national, long-range mineral research projects. Although the establishment of well-equipped, adequately staffed minerals research laboratories may well be beyond the resources of less developed areas, in the early stages of development, the establishment of a small scale laboratory devoted to analytical and simple ore dressing work should be given early consideration. It is from such small beginnings that the Canadian Mines Branch laboratories grew; during the half century that the Mines Branch has been in existence most, if not all, mining companies in Canada have benefitted substantially from the services provided by these laboratories.

(c) Mineral Resources Division This unit of the federal Department of Mines and Technical Surveys is engaged in mineral resource and mineral economic studies. The Division also has no counterpart in the various provinces, although one of the major mining provinces has recently formed the nucleous of a group to make studies in the resource-economics field. The federal Mineral Resources Division was formed in 1886 in the Geological Survey of Canada and it remained an integral part of either the Geological Survey of Canada (1886-1907) or of the Mines Branch (1907-1956) until 1956 when it became an independent operating unit of the department. The Division now has an establishment of 30 professionals and 24 supporting personnel. In its early years the Division had two main functions - the detailed geological examination of specific mineral deposits and the collection, compilation and publication of mineral statistics. The work of the Division now lies in the mineral resources, mineral economics, mineral legislation, mineral-taxation, and governmental administration fields rather than in scientific laboratory research or detailed field surveys. It advises senior departmental and other governmental officials on matters affecting Canadian mineral policy. It carries out technical-economic and legislative studies on all phases of the Canadian mineral industry; it administers the government's cost-aid financial assistance to the gold mining industry; it arranges foreign technical aid training programs in the domestic minerals field; and it maintains extensive records on all matters pertaining to domestic mineral resources and some record of matters pertaining to foreign mineral resources. Mineral development programs, in less developed areas should include the early establishment of a small group to work in the field of resource-economics. An important contribution of this group could be the careful evaluation of all programs directed towards mineral development to ensure that available funds are expended on those programs which show the best possibility of providing economic benefit to the nation. Cost-benefit analyses are always important; they are vital when funds are limited.

(d) Aerial Photography The importance and usefulness of aerial photographs in the development of Canada cannot be overstressed. Firstly, they provide a basic tool for the Surveys and Mapping Branch of the federal Department of Mines and Technical Surveys in the preparation of the Branch's National Topographic Series of maps. Secondly, they are of direct use to industry through the National Air Photo Library first established as a reference service in 1925. This library has a file of upwards of 3 million photographs, there being one print from each aerial negative taken by or for the federal government. It would seem highly desirable for less developed countries to consider the establishment of a National Air Photo Library as a necessary first step in the launching of a minerals exploration program.

(e) Roads For some years, the federal government has followed a policy under which it provides financial assistance for the construction of roads, railroads, airstrips, power facilities, docks, harbours, and housing in connection with the development of mineral resources. For the last quarter of a century it has provided financial assistance in the construction of mine access roads, under an arrangement whereby the company pays one third of the cost of construction, the province pays one third and the federal government pays one third. During the past five years, special Northern Development Roads and Roads to Resources programs have been implemented by the federal government, the latter being in collaboration with the various provinces. In addition to federal-provincial co-operation in the provision of mine access roads, most provinces maintain their own mine access road programs as a means of encouraging exploration and development.

(f) Railroads Although virtually all railroad building in Canada since World War I has been financed out of the project responsible for rail line construction, certain special circumstances have induced governments to finance rail construction in the interest of general areal development. The 430-mile Pine Point railway, to be financed largely by the federal government, will provide long-term encouragement to mineral development in the Northwest Territories, for which the federal government has administrative responsibility.

(g) Airstrips Because of the tremendous size of Canada and the resultant isolation of many mineral developments, the federal government has an active program of airstrip construction for mining communities. This program has value both during the development phase of the project and during the active exploitation of the deposit.

(h) All these forms of assistance - roads, railroads, airstrips, docks, harbours, housing, and, more recently, telecommunications, are areas wherein a government can encourage and assist mineral development and exploitation. They have been of great importance in the development of the Canadian mineral industry and similar aids could be of substantial help in the development of a mineral industry in a less developed area.

Subsidies

17) Canada, both federally and provincially, has traditionally avoided resorting to subsidies in support of depressed mineral industries. The principle that has been followed, with two important exceptions, is that mineral enterprises must be economically viable in the legislative and commercial environment in which they operate. The two exceptions are gold and coal.

18) In the case of gold, a number of dependent communities have been built up around operating gold mines, particularly in the provinces of Ontario and Quebec. With the fixed price of gold which has existed for the past 28 years and with steadily rising operating costs, the higher-cost mines - and, hence, their dependent communities - have been assisted for the past 14 years by the federal government's Emergency Gold Mining Assistance Act. This Act provides financial assistance, on the basis of operating costs, to higher cost mines. In 1961, lode gold mines received a total of 12.5 million dollars assistance under this Act.

19) The circumstances involving the coal industry are somewhat similar; a number of wholly-dependent communities have been built up around the coal mines in eastern and western Canada. Distance from markets, declining markets and rising costs have aggravated the social problems of the dependent communities. The coal problem is a long-standing one of 34 years' duration and one with no easy solution. To assist the dependent communities, federal transportation

subventions are provided on the shipment of coal to central Canadian markets, for sale under competitive conditions. Within the past year, an additional small direct subsidy, on all coal shipped, has been provided to encourage sales locally within the Atlantic provinces. In the case of western Canada, transportation subventions are also provided to enable Canadian bituminous coal to compete in the Japanese market. The total financial assistance provided in 1961 through transportation subventions amounted to approximately 18 million dollars. About one third of the coal moved under subvention to markets in central Canada is consumed in federal government installations. Coal is further assisted by the Coal Production Assistance Act which provides low interest capital loans for modernization and mechanization. Coal is also assisted, indirectly, by The Atlantic Provinces Power Development Act which helps to provide low cost power, based on coal, for industrial uses in the four Atlantic Provinces.

20) The Province of Nova Scotia also assists its coal industry, and hence the dependent communities, through loans and direct financial subsidies to small coal mines within the province. The total amount of money directed in this manner by the province amounts to a few hundreds of thousands of dollars per year. These are the only direct provincial subsidies to mineral enterprises in Canada. In striking contrast to the financial assistance which Nova Scotia provides its coal industry, the Province of Alberta provides money to move miners and their families from moribund coal mining centres to places of employment elsewhere in the province. The Alberta program has been highly successful.

21) The effect of the federal and provincial government assistance programs for both gold and coal has been to provide social assistance to dependent communities in a manner which will not be harmful to other nations engaged in the production of gold and coal. However, despite the 14 years in which 156 million dollars of federal assistance has been paid for gold and the 34 years in which 170 million dollars of federal assistance has been paid for coal, the problems of the communities not only remain but they have become more intense. As the gold and coal reserves which support the dependent communities have been gradually but continuously depleted, both the population and the social capital in the communities have grown. At this particular point in time, the problems of the dependent communities are greater than they were at the commencement of the subsidies. Developing areas, when faced with the problems of depressed mining communities, should explore all possible solutions before embarking on subsidy programs. Subsidies tend to be self-perpetuating and rarely do they solve the problems to which they are applied; if they have any value it is that they alleviate immediate distress and postpone the solution of the problem until other remedial measures may be adopted.

Bounties

22) An example of the principle of encouragement to the mineral industry, both provincial and federal, has been the use of bounties, occasionally in company with, but usually in preference to, national tariffs, to foster the birth and growth of infant industries based on indigenous mineral raw materials. Bounties have been used by the provinces of Ontario and British Columbia, for specific periods of time, to promote the establishment of primary iron and steel production based on indigenous iron ore. The Ontario iron ore bounty was of concrete assistance in the development of the first low grade iron ore property on the North American continent - a siderite mine in the Michipicoten area of Ontario. The British Columbia iron ore bounty was of important assistance in the establishment of the province's first electric pig iron plant based on pyrrhotite mine tailings at Kimberley, British Columbia. In 1961, British Columbia also established a bounty on the production of blister and refined copper within the province; by this bounty, the province hopes to encourage the development of a copper smelting

and refining industry. On the national level, the federal government still provides a bounty for the use of domestic coal to produce domestic pig iron. Two producers, directly in the case of a producer in Nova Scotia and indirectly in the case of a producer in British Columbia, benefit from this bounty under the Canadian Coal Equality Act. In both these instances, there is no Canadian tariff on iron ore or on coal used in the production of primary iron and steel.

23) The use of bounties has been moderately successful in Canada, most notably where the general economic conditions surrounding a specific mineral project have been almost, but not quite, favourable. In these circumstances, the provision of a bounty has tipped the scales toward the favourable side. Bounties have had no success where economic conditions were clearly against the project. They do constitute, in certain circumstances, a useful tool for the development of infant primary industries in less developed areas.

Tariffs

24) Tariffs may also be helpful in establishing basic primary industries. Although Canadian tariffs on imported crude minerals are either non-existent or minimal, the federal government, which has jurisdiction in all tariff matters, has employed tariffs on a moderate scale to promote primary industry and to help it in its formative years. In the use of tariffs, great care should be taken to ensure that they do not become a shelter for inefficient industry.

Government Participation in Mining and Oil Enterprises

25) The present state of mineral development in Canada results almost entirely from the efforts of private enterprise operating under encouraging and incentive-creating legislation. Only rarely have any of the eleven governments become intimately involved in mineral development or exploitation. Since the exceptions have been so rare it is useful to describe them.

26) During World War II, the federal government considered it necessary to operate a small number of Crown corporations to obtain certain strategic minerals. One of these, Wartime Metals Corporation, operated tungsten, molybdenum, chromite and magnesium mines during World War II and disposed of its assets to private industry following the war. Another, Wartime Oils Limited, through loans to private operators, financed the drilling of 22 oil wells in the Turner Valley field of Alberta; 21 of these wells were successful and the project as a whole returned the federal government's capital investment. Abasand Oils, Limited, also a Crown corporation, sponsored exploratory drilling and research into the Athabasca oil sands of Alberta. Another Crown corporation, Eldorado Mining and Refining Limited, purchased, in 1944, the radium mine at Port Radium on Great Bear Lake, Northwest Territories, to continue the production of uranium used in the World War II Manhattan Project. Although the ore reserves at Port Radium were exhausted two years ago, Eldorado Mining still operates uranium mines near the north shore of Lake Athabasca, Saskatchewan, (brought into production in 1953), a uranium refinery at Port Hope, Ontario, and uranium research facilities in Ottawa, and it acts as the government purchasing agent for privately produced uranium concentrate. Its exploration and production activities are confined entirely to the strategic material, uranium.

27) On the provincial level, Saskatchewan produces and markets sodium sulphate from natural deposits at Chaplin. The Province of Newfoundland for a short period during the 1950's operated a gypsum mine and wallboard plant on its west coast; this operation has now been taken over by a private company. In the 1950's the Newfoundland government was also directly engaged in mineral exploration, an activity which has been abandoned.

28) This has been virtually the limit of direct government involvement in mineral exploitation in Canada. During 1961, the total dollar value of all production from government exploitation was about $27 million, or one per cent of Canada's mineral production - a minor percentage and one which results largely from strategic necessity. Less developed nations, as with more developed nations, have limited financial resources, whether the resources be drawn from domestic taxpayers or raised by borrowing. In such situations, there is much benefit in creating a national climate that will attract private domestic and foreign capital into mineral exploration and development, rather than in using precious public funds on such development. The benefits to Canada of employing such a policy have been tremendous, creating an industry which has proven to be a mainstay of the domestic economy.

Commissions of Enquiry into Broad Regional and National Mineral Problems

29) One of the institutions resulting from Canada's British heritage is the appointment of Royal Commissions to enquire into and make recommendations on matters of broad regional or national concern. The mineral industry has received its share of Royal Commissions at both the federal and provincial levels. The coal industry, in particular, has received more than its share with Royal Commissions having been appointed at various times by the provincial governments of Nova Scotia, New Brunswick, Saskatchewan, Alberta and British Columbia, and a total of three Royal Commissions having been appointed by the federal government. In addition, the coal industry has been the subject of numerous enquiries by Special Committees of both the House of Commons and the Senate. The Royal Commission on Canada's Economic Prospects, appointed in 1955, was responsible for two major studies of the mineral industry - one on minerals and one on energy - along the lines of the world-famous United States "Report of the President's Materials Policy Commission". The federal Royal Commission on Energy, appointed in 1957, resulted in the formation of the National Energy Board and the implementation of a National Oil Policy.

30) Although the recommendations of all Royal Commissions are, by no means, implemented in their entirety, a surprisingly large number are eventually adopted and some of those adopted over the years have brought about important developments in the Canadian mineral industry. The recommendations of the Ontario Royal Commission on Nickel in 1917, brought about the refining in Ontario of nickel produced in the Sudbury area of Ontario. In the case of the Royal Commission on Energy, the Commission recommended that the level of Canadian oil production be brought up to a certain prescribed level within a specified period of time. Although Canada's new National Oil Policy constitutes a modification of the Royal Commission targets, it has set domestic production targets for 1961 and 1963. The policy was expressed in a simple statement from the Minister of Trade and Commerce; it has not been translated into legislation. The target for 1961 was met by the voluntary and co-operative efforts of the various companies engaged in the producing and consuming sectors of the petroleum industry of Canada.

31) Commissions of enquiry do, therefore, constitute one of the sources of Canadian mineral policy, and a stimuli to mineral development particularly in areas of broad regional or national concern. In similar circumstances, they may provide a useful technique for developing nations.

Education

32) In Canada, education is constitutionally the responsibility of the ten provinces. Within the provinces, there are three basic levels of education - primary, secondary, and university. Except for supporting technicians, it is the responsibility of the universities to supply the mineral industry with trained

professional staff. Of the 47 degree-granting universities and colleges in Canada, only 20 give courses leading to degrees in one of the mineral industry disciplines, graduating about 500 new professionals per year. Canada has no university or college devoted solely to mineral industry subjects.

33) The university year, lasting from mid-September to mid-May, is ideally suited to Canadian conditions of climate which, in turn, has a considerable influence on domestic industrial activity, particularly in the mineral resources sector. The long summer recess provides students with an opportunity to earn money; to obtain practical experience; and, at the Master's and Ph.D. levels, to obtain a thesis problem. In the provision of summer employment there is complete co-operation between industry, government and the universities. The universities provide the theoretical education; industry and government provide the practical experience. Very tangible benefits accrue to all concerned.

34) Supplementing the universities in supplying trained professional staff, is one technological institute which provides a two year practical course in mineral industry trades. This institute makes a vital contribution in training an average of 50 technologists a year for useful and responsible employment.

35) In Canadian experience there are a number of elements which might warrant consideration by less developed areas. Firstly, the blending of a shortened university year with an industry field season would seem to have much merit. It would permit a marrying of theory with practice, so necessary in a developing mineral economy. It would help to weed out those unsuited to conditions in the mineral industry before too much time, effort and public money has been spent on their education. It would encourage the industry itself to take a responsible, enlightened and helpful approach towards the training of replacement engineers. Secondly, the establishment of a technological institute, at far less cost than a university or college, would make it possible to provide in one half the time a proportionately larger number of semi-professionals trained for positions of responsibility.

Conclusions

36) The attainment of a mineral industry presupposes the existence of mineral occurrences under geological conditions favourable to economic exploitation. If this situation is not present, there would seem to be little reason to spend money on exploration. If it is present, then much benefit can come from expenditures on mineral exploration.

37) .Canadian experience indicates that enlightened, consistent government policy is needed to encourage mineral exploration, development and exploitation; that the special needs of the mineral industry are best met by incentive-creating legislation; that corporate affiliations may be most useful in both the provision of capital for mine finance and the provision of markets for primary mineral output; and that a supply of trained engineers, scientists and technicians is essential to a sound and lasting mineral development program.

38) The development of a nation's mineral resources for internal use and for export is a basic means of providing new wealth. In the case of less developed countries, mineral development is a logical first step towards mineral self-sufficiency; it permits the acquisition of foreign exchange; it enables the development of technical "know-how"; and it promotes the development of related resource-based secondary industry.

838 E - Oct.1962 - 1,600